WHAT WOULD BE SEEN IF THE ATLANTIC OCEAN DRIED UP:

THE VAST MOUNTAIN RIDGES AND PLAINS OF THE SEA-FLOOR.

IT is a great pity that we will never be able to visit that romantic continent which would be revealed by the drying-up of the Atlantic. The nearest we can get to it without the danger of a watery death is to wander in imagination over the remarkable maps which are shown here. The information which is given here is drawn largely from a book published by the Geological Society of America, "The Floors of the Oceans: I.—The North Atlantic," by Bruce C. Heezen, Marie Tharp and Maurice Ewing. The book may be obtained from the office of the Secretary to the Geological Society of America, 419 West 117th Street, New York 27, N.Y., U.S.A., and costs 4.50 dollars. The large map may be obtained from the same source, price 1.50 dollars. These diagrams help to display one of the most interesting of recent oceanographical discoveries: the rift valley

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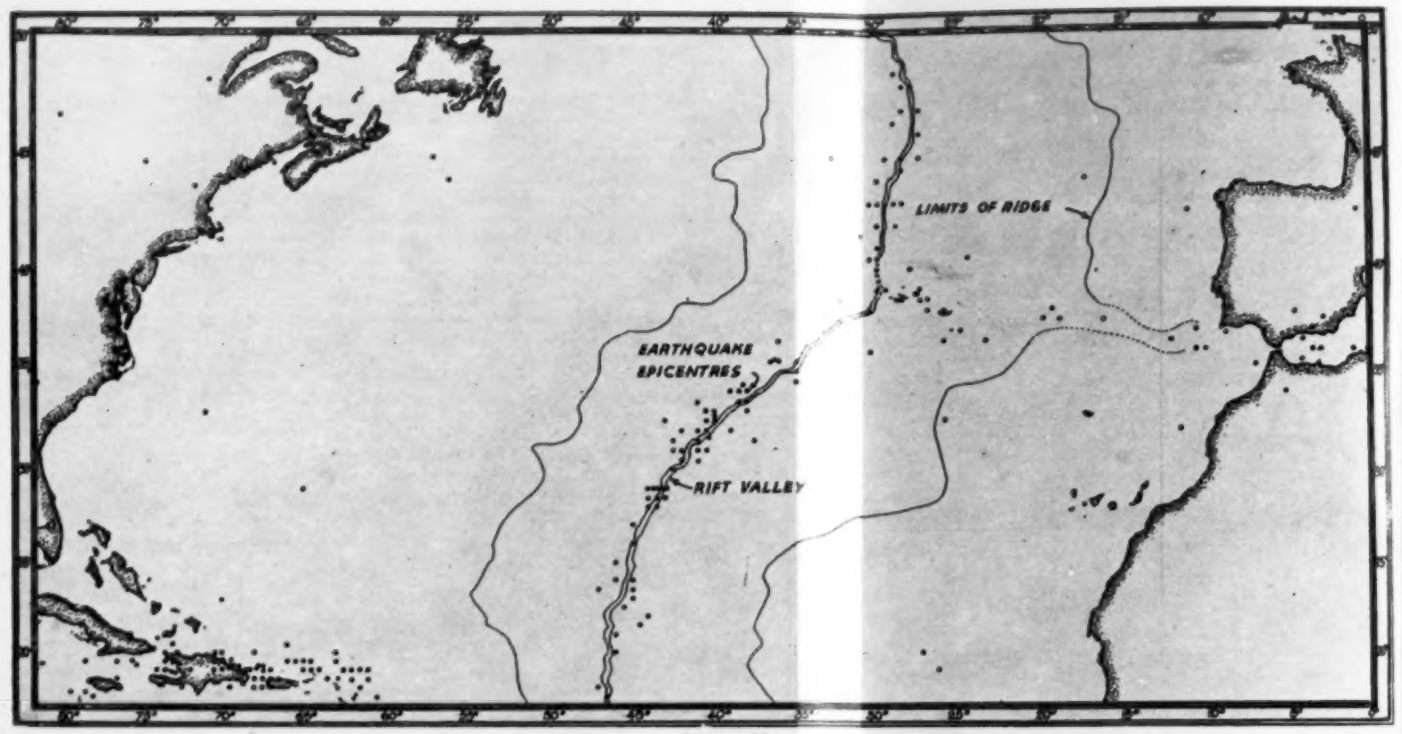
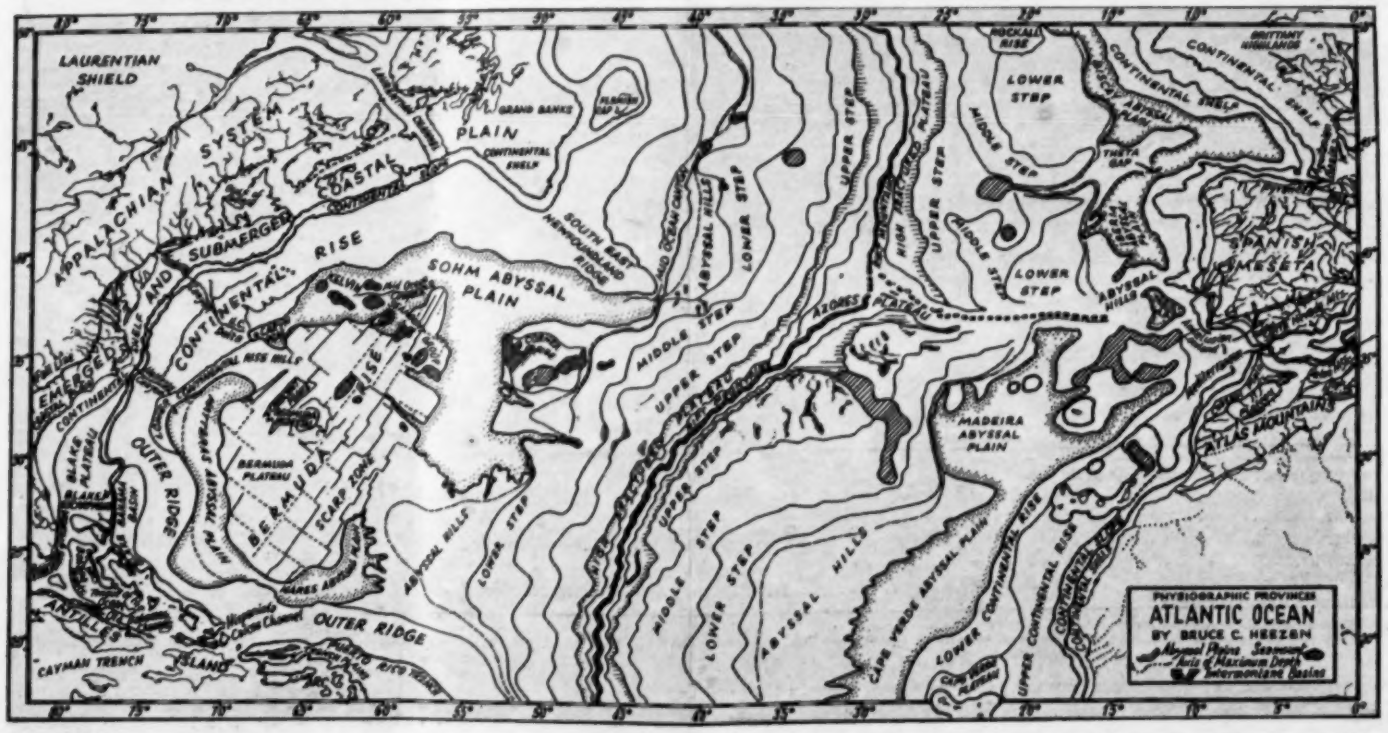


(Right.) A MAP SHOWING THE DISTRIBUTION OF EARTHQUAKE EPICENTRES DOWN THE MIDDLE OF THE ATLANTIC. ALMOST ALL THESE EPICENTRES COINCIDE WITH THE RECENTLY-DISCOVERED RIFT VALLEY OF THE MID-ATLANTIC RIDGE.



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which runs in a deep canyon down the mid-Atlantic mountain ridge. This submarine mountain ridge is thought to be only part of one which runs for 40,000 miles across the bottom of all oceans. This ridge has not been mapped entirely but the North Atlantic stretch of it has received considerable attention. It has also been discovered that almost all of the many mid-ocean epicentres of earthquakes lie within the area of the mid-Atlantic rift-valley; this can be seen from the first of the small diagrams reproduced here. This shows that the rift valley is an active fracture in the earth's crust; the earthquakes are aroused by crustal activity along the fracture. It was in 1953 that Miss Marie Tharp, who was working with Mr. Bruce C. Heezen on a diagram of the floor of the Atlantic based on echo-sounding profiles, noticed that she had drawn a deep rift down the central Atlantic ridge; this discovery of a rift valley was confirmed by further study and it is now being related to the earthquake epicentre belt throughout the oceans of the world. This combination of ridge and rift was confirmed in many parts of the world by research vessels taking part in the International Geophysical Year studies. One of the places where the rift can partly be seen is Iceland, which is cut right across by a depression called the Graben. The Graben contains many active fissures and tension cracks and all the recent volcanic activity in Iceland has been limited to it. Studies of the tension cracks which are called *gjá* show that the Graben is growing wider every year. Something else which seems to be connected with the ridge and rift system of the mid-ocean type is the rift valley system of the East African plateau. A cross-section of the mid-ocean rift is very like one of the African rift, which indeed appears to be a continuation inland of the Carlsberg Ridge, a submarine system in the Indian Ocean which was discovered in the 1920s. The Carlsberg Ridge enters Africa at the Gulf of Aden; part of it runs south below Lake Tanganyika while the other part continues up the Red Sea, where it unites with the Palestine rift. Other

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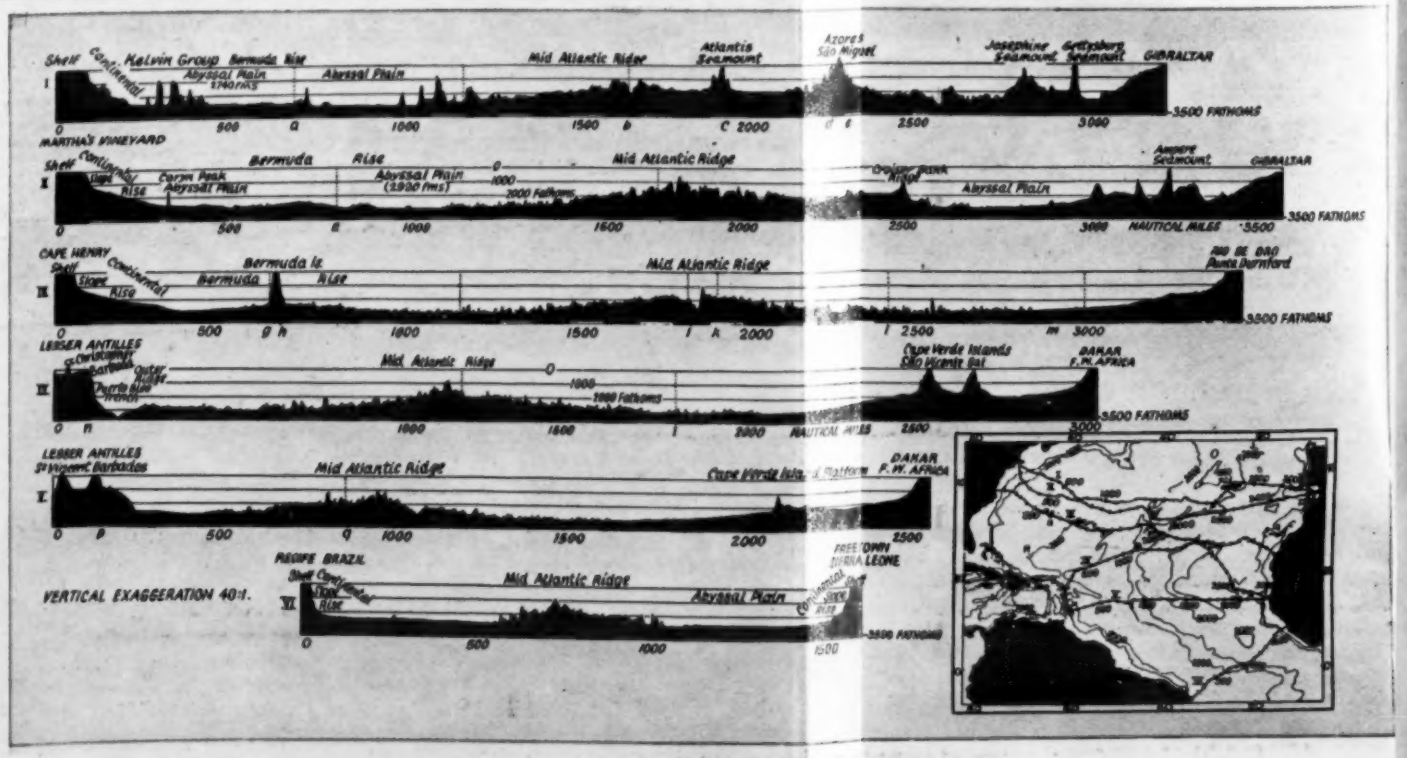
(Right.) SIX TRANSATLANTIC TOPOGRAPHICAL PROFILES SHOWING THE EXTRAORDINARY VARIETY OF LOW- AND HIGH-LYING GROUND. THE LETTERS A—Q SHOW WHERE ECHO SOUNDINGS FROM DIFFERENT CRUISES WERE JOINED.



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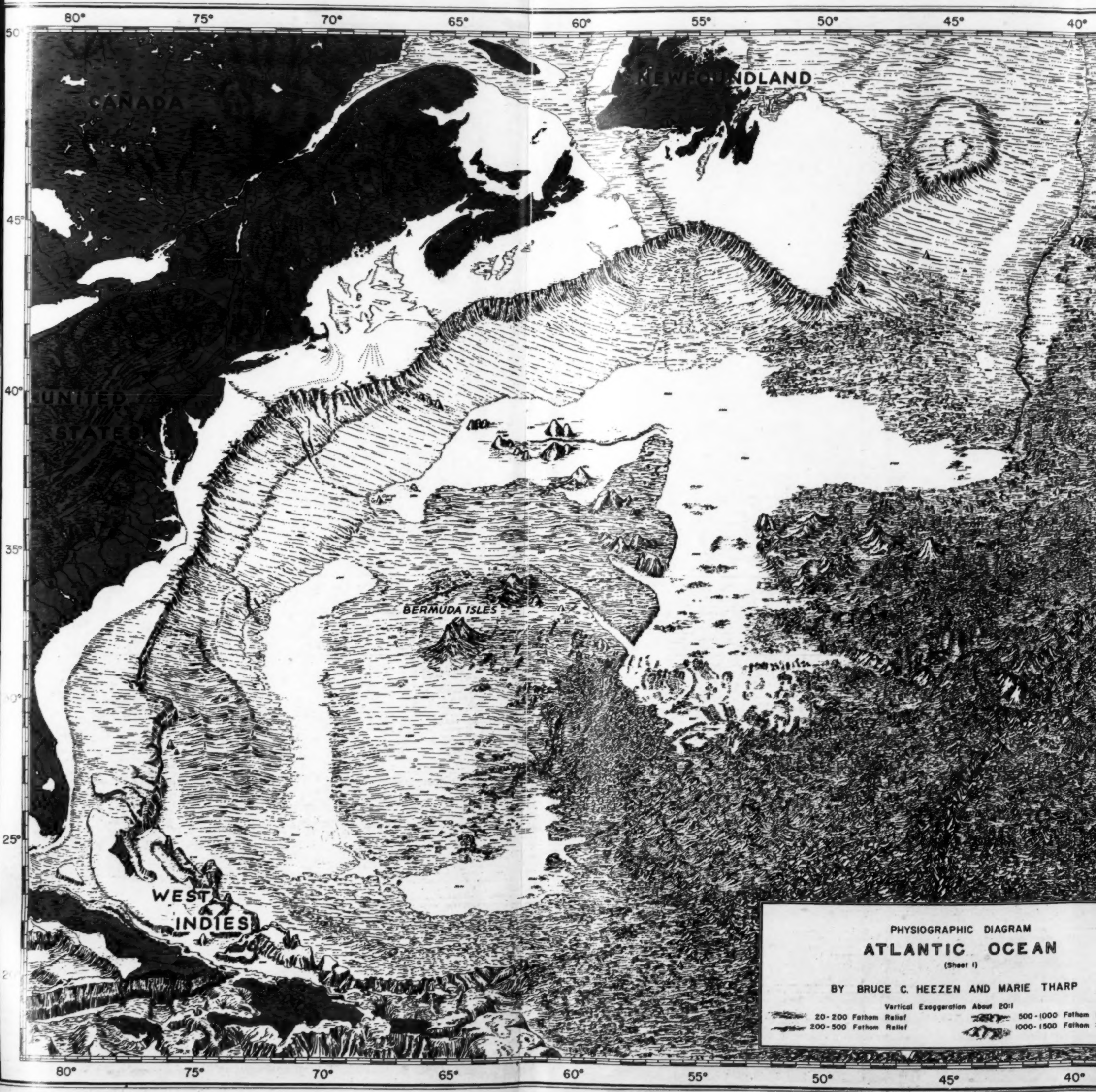
appearances on land of the mid-ocean rift are found in the south-western Pacific, where it connects with the Great Alpine Fault of New Zealand. It is not surprising that a discovery of such magnitude should produce a host of theories to explain it. Since volcanic activity is still very strong along the mid-Atlantic ridge, it is presumed that these mountains are of relatively recent formation and cannot be thought to have been formed by any movement of "continental drift" in the usual forms of that hypothesis. The fact that these rifts are opening up on all sides of every continent points to a deeper cause than the changes in positions of the continents. If the continents were moving, then some rifts would be closed up and there is no evidence of this happening. Mr. Heezen has suggested, to explain the existence of these rift valleys, that the earth is expanding and not shrinking, as some maintain. If the earth were in a state of expansion and the continents remained constant in size, then there would be a need for the formation of more crusts in the ocean and this is apparently what is happening in the case of these rift valleys. That the continents have changed their relative positions is upheld by the study of palæomagnetism which deals with the evidence of the earth's magnetism in the geologic past. Another explanation of these ridge and rift systems is based on convection currents within the earth. It has been shown that heat flows much faster through these rift valleys from the interior of the earth than through other parts of the ocean, and this has aroused the suggestion that convection currents rise to the crust just under the mid-ocean rift. By the upward and lateral movement of the current the rift would be pulled apart and material would be pushed through it. Whatever the true explanation of this submarine rift valley—and these two theories remain purely speculative—even those who are quite incapable of offering a solution will enjoy poring over the course of this vast canyon on these maps and letting their minds wander up mountains where their feet will never tread.

(Left.) THE PHYSIOGRAPHIC PROVINCES OF THE ATLANTIC OCEAN, SHOWING THE RIFT RUNNING DOWN THE MOUNTAINS OF THE MID-ATLANTIC RIDGE. THIS RIFT VALLEY WAS DISCOVERED BY ECHO SOUNDINGS.



The diagrams and information from the book, "The Floors of the Oceans: I—The North Atlantic," and the Atlantic chart are reproduced by courtesy of the Geological Society of America and Bruce C. Heezen.

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